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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Confirmation No.: 2184
Ji-Sung PARK, Red-Heat OH, Sang-Hyuk IM and Kwon-Jin KANG	Group Art Unit: 3676
Serial No.: 10/784,793	Examiner: Mark A. Williams
Filed: February 24, 2004	Customer No.: 34610

For: SWIVEL HINGE AND PORTABLE TERMINAL USING THE SAME

SUBMISSION OF ENGLISH-LANGUAGE TRANSLATIONS OF CERTIFIED PRIORITY DOCUMENTS

U.S. Patent and Trademark Office
Customer Window, Mail Stop Amendment
Randolph Building
401 Dulany Street
Alexandria, Virginia 22314
Sir:

As a supplement to the Amendment filed February 22, 2006, attached are the English-language translations of Korean Application Nos. 2003-0047443 and 2003-0047445, both filed July 11, 2003.Should the appropriate U.S. Patent and Trademark official have any questions regarding this submission, they are requested to contact Applicants' attorney at the telephone number listed below.If any fees are required, please charge them to Deposit Account No. 16-0607 and advise the undersigned accordingly.

Respectfully submitted,
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CERTIFICATION

It is hereby declared that the translation of Korean priority application No. 2003-0047443 filed on July 11, 2003 is true and correct.

Seoul, February 28, 2006
Translator: Kim Jukwang

【Name of Document】 Application Document

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【Title of Invention】 스위블힌지 및 이를 사용한 휴대용 단말기

【Title of Invention in English】 Swivel hinge and potable terminal using the same

【Applicant】

【Name】 LG Electronics Inc.

【Applicant's Code】 1-2002-012840-3

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【Agent's Code】 9-2003-100041-1

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【Purport】 submitted hereby is a application document pursuant Article 42 of Patent Law

Agent Woorin Patent Firm (sign)

【Fee】

【Basic Fee】	20 pages	29,000 won
【Additional Fee】	4 pages	4,000 won
【Priority Claim Fee】	0 item	0 won
【Request for Examination Fee】	0 claim	0 won
【Amount of Fee】		33,000 won

【ABSTRACT OF THE DISCLOSURE】

【SUMMARY】

Disclosed are a swivel hinge and a portable terminal having the swivel hinge. The swivel hinge has a first hinge section 20 having a first hinge shaft 24 as a rotational center thereof and a second hinge section 30 connected to the first hinge section 20 and having a second hinge shaft 34 as a rotational center thereof. The second hinge shaft 30 extending in a direction perpendicular to an extension direction of the first hinge shaft 24. The first and second hinge sections 20,30 include first and second magnets 26,36 having polarities different from each other in such a manner that attractive force is created between the first and second magnets 26,36 when the first and second hinge sections 20,30 are positioned in parallel to each other. According to the present invention, the swivel hinge can be relatively simplified and, endurance and reliability can be improved.

【REPRESENTATIVE VIEW】

Fig. 3

【INDEX】

portable terminal, swivel hinge, main body, rotation, display section

【DESCRIPTION】

【TITLE OF THE INVENTION】

SWIVEL HINGE AND PORTABLE TERMINAL USING THE SAME

【BRIEF DESCRIPTION OF THE DRAWINGS】

FIG. 1 is a perspective view showing a portable terminal having a conventional swivel hinge;

FIG. 2a is a side view showing a portable terminal having a conventional swivel hinge, in which a display section is located in an open position;

FIG. 2b is a side view showing a portable terminal having a conventional swivel hinge, in which a display section is rotated;

FIG. 3 is a perspective view showing a swivel hinge according to one embodiment of the present invention;

FIGS. 4a to 4e are operational views showing operational states of a swivel hinge according to one embodiment of the present invention;

FIG. 5 is a partially sectional perspective view showing a portable terminal having a swivel according to one embodiment of the present invention;

FIG. 6 is a partially sectional perspective view showing a portable terminal having a swivel according to another embodiment of the present invention;

* Description of symbols of major parts in the drawings *

20: first hinge section	22: body plate
24: first hinge shaft	26: first magnet
30: second hinge section	32: connecting plate

34: second hinge shaft

36: second magnet

40: main body section

42: key

45: rotation guide member

50: display section

52: display screen

【DETAILED DESCRIPTION OF THE INVENTION】

【PURPOSE OF THE INVENTION】

【TECHNICAL FIELD IN WHICH THE INVENTION IS INCLUDED AND THE PRIOR ART IN THAT FIELD】

The present invention relates to a portable terminal, and more particularly to a portable terminal having a swivel hinge allowing a display section to rotate in a state that the display section is opened.

As generally known in the art, persons use various functions of portable terminals while carrying the portable terminals. Portable terminals include cellular phones, PDAs and smart phones. Recently, portable terminals equipped with cameras have been produced. In order to improve convenience of use of portable terminals, a swivel hinge is provided in the portable terminal so as to allow a display section to rotate with respect to a main body section of the portable terminal in a state that the display section is opened.

FIGS. 1 and 2 show a conventional portable terminal having a swivel hinge. Referring to FIGS. 1 and 2, various parts including a main board are installed in a main body section 1. The main body section 1 is provided at a front surface thereof with a plurality of keys 3 for allowing a user to input various information.

A display section 5 is connected to one end of the main body

section 1. The display section 5 is provided with a display screen 7 for displaying various kinds of information. The display section 5 is coupled to the main body section 1 through a swivel hinge 10 in such a manner that the display section 5 can be moved from an open position to a closed position, or vise versa, with respect to the main body section 1 while being rotated in a direction perpendicular to the moving direction.

The swivel hinge 10 includes a first hinge section 12 positioned between a pair of rotation guide members 11, which are integrally formed at both upper side ends of the main body section 1. The first hinge section 12 functions as a rotational center when the display section 5 is moved from the closed position to the open position, or vice versa, with respect to the main body section 1. FIG. 2a shows a side view of the conventional portable terminal when the display section 5 is located in the open position with respect to the main body section 1.

In addition, a second hinge section 13 is provided at one side of the first hinge section 12 perpendicularly to a length direction of the first hinge section 11. A rotational center line of the first hinge section 12 is perpendicular to a rotational center line of the second hinge section 13. The display section 5 is connected to the second hinge section 13.

Accordingly, if the second hinge section 13 rotates with respect to the first hinge section 12, the display section 1 is rotated in a left or a right direction of the main body section 1 when viewed from a front of the main body section 1. FIG. 2b shows the display section 5 rotated in the left direction of the main body section 1.

Generally, when the display section 5 moves or rotates about the

first and second hinge sections 12 and 13 by a predetermined angle, the display section 5 is automatically shifted into a predetermined position with respect to the main body section 1. In order to perform the above function, a spring (not shown) is installed so as to allow the first and second hinge sections 12 and 13 to elastically bias the display section 5 towards the predetermined position, or cam mechanism is adopted in the portable terminal.

For example, as shown in FIG. 2a, the display section 5 can be rotated from the main body section 1 by an angle of approximately 135°, or can be shifted into the closed position by applying elastic force of the spring to the display section 5 utilizing cam mechanism. In addition, in a case of the second hinge section 13, if the display section 5 rotates by a predetermined angle, the display section 5 is shifted into predetermined positions as shown in FIGS. 2a and 2b.

However, the conventional portable terminal has problems as follows:

Firstly, since the spring and cam mechanism are used for automatically shifting the display section 5 to the predetermined position when the display section 5 rotates by the predetermined angle, the number of parts for the swivel hinge 10 is increased or it is inconvenient that users must currently do form the cam structure.

In addition, if the swivel hinge 10 is formed by using the conventional spring and cam mechanism, the elastic property of the spring may deteriorate or wear of the spring may occur when the swivel hinge 10 has been used for a long time, thereby lowering the reliability of

the swivel hinge 10.

In addition, if spring or cam mechanism is used, stopper mechanism has to be made to stop the relative movement between the main body 1 and the display section 5. Therefore, the manufacturing cost of the portable terminal having the swivel hinge is too high.

【TECHNICAL TASK WHICH THE PRESENT INVENTION TRIES TO BE OBTAINED】

Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the conventional art, and an object of the present invention is to provide a swivel hinge having a simple structure while minimizing a mechanical construction.

Another object of the present invention is to provide a swivel switch having superior reliability and endurance.

【CONSTITUTION OF THE INVENTION】

To accomplish the above objects, according to a first aspect of the present invention, there is provided a swivel hinge comprising: a first hinge section having a first hinge shaft as a rotational center thereof; a second hinge section connected to the first hinge section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft; and first and second magnets provided at first and second hinge sections, respectively, corresponding to each other and having polarities different from each other in such a manner that attractive force is created between the first and second magnets when the first and second hinge sections are positioned parallel to each other.

The second hinge shaft is rotatably installed at one side of the first hinge section such that the second hinge shaft is rotated together with the first section when the first hinge section rotates about the first hinge shaft.

The first and second magnets are located on both lengthwise ends of the first and second hinge sections at positions, which are farthest from the second hinge shaft.

The first magnet is installed at both ends of a body plate of the first hinge section and the second magnet is installed at both ends of a connecting plate of the second hinge section.

The first magnet is formed at both ends of a body plate of the first hinge section and the second magnet is formed at both sides of a connecting plate of the second hinge section by magnetizing both ends of the body plate and the connecting plate.

According to a second aspect of the present invention, there is provided a portable terminal comprising: a main body section; a display section connected to one end of the main body section and having a display screen; a first hinge section having a first hinge shaft rotatably coupled to a rotational center portion formed in the main body section; a second hinge section connected to the display section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft so as to be rotatably coupled to the first hinge section; and first and second magnets provided at first and second hinge sections, respectively, corresponding to each other and having polarities different

from each other in such a manner that attractive force is created between the first and second magnets when the first and second hinge sections are positioned parallel to each other.

The first magnet is installed at both upper side ends of the main body section and the second magnet is installed at both lower side ends of the display section corresponding to the first magnet in farthest positions from the second hinge shaft.

According to the present invention, the structure of the swivel hinge and portable terminal using the same is simplified and, endurance and reliability are improved.

Hereinafter, a swivel hinge and a portable terminal having the swivel hinge according to a preferred embodiment of the present invention will be described with reference to the accompanying drawings.

FIG. 3 shows a perspective view of a swivel hinge according to one embodiment of the present invention.

As shown in FIG. 3, the swivel hinge of the present invention mainly includes a first hinge section 20 and a second hinge section 30. Members of the portable terminal performing a relative rotating action by means of the swivel hinge, such as a main body section and a display section, are connected to the first and second hinge sections 20 and 30. The first hinge section 20 is rotatably installed at a rotational center of the main body section.

The first hinge section 20 has a body plate 22 provided at both sides thereof with a first hinge shaft 24. The body plate 22 rotates together with the first hinge shaft 24, so it is preferable to integrally

fabricate the body plate 22 with the first hinge shaft 24. However, it is also possible to fabricate the hinge shaft 24 and the body plate 22 separately. In addition, although the first hinge shaft 24 is illustrated as a cylindrical shape, the present invention does not limit the shape of the first hinge shaft 24 if the first hinge shaft can rotate about a rotational center.

The body plate 22 is provided at both ends thereof with a first magnet 26, respectively. The first magnet 26 can be positioned on the body plate 22 with various structural patterns. Although FIG. 3 shows the first magnet 26 inserted into a slot formed on the body plate 22 without protruding from the body plate 22, the first magnet 26 can be installed on the body plate 22 while protruding from an upper surface of the body plate 22. In addition, it is also possible to form a predetermined portion of the body plate 22 as the first magnet 26 by magnetizing the predetermined portion of the body plate 22.

The second hinge section 30 has a connecting plate 32. The connecting plate 32 is coupled to one of members of the portable terminal, which can be rotated relative to each other by means of the swivel hinge. For example, the connecting plate 32 is connected to the display section of the portable terminal.

The connecting plate 32 of the second hinge section 30 has a second hinge shaft 34. The second hinge shaft 34 is rotatably connected to the body plate 22 of the first hinge section 20. An imaginary rotational center line of the second hinge shaft 34 is perpendicular to an imaginary rotational center line of the first hinge shaft 24.

The connecting plate 32 is provided at both ends thereof with a second magnet 36, respectively. The second magnet 36 is positioned on the connecting plate 32 such that the second magnet 36 faces the body plate 22. The second magnet 36 has a polarity opposite to a polarity of the first magnet 26 formed on the body plate 22. If the first magnet 26 has an N-pole, the second magnet 36 has an S-pole. Thus, attractive force is created between the first and second magnets 26 and 36.

Accordingly, the connecting plate 32 and the body plate 22 rotated about the second hinge shaft 34 can be positioned in parallel to each other due to attractive force between the first and second magnets 26 and 36.

Preferably, the first magnet 26 of the body plate 22 and the second magnet 36 of the connecting plate 32 are located at positions, which are farthest from the second hinge shaft 34.

Hereinafter, a portable terminal equipped with the swivel hinge having the above structure will be described with reference to FIG. 5. The portable terminal includes a main body section 40 and a display section 50, which are connected to each other by means of the swivel hinge. The display section 50 rotates about the first hinge shaft 24 with respect to the main body section 50. That is, the display section 50 is movable from a closed position, in which the display section 50 is overlapped with the main body section 40, to an open position, in which the display section 50 is shifted away from the main body section 40, or vice versa. In addition, when viewed from a front of the main body section 40, the display section 50 rotates in directions left or right to the

main body section 40 about the second hinge shaft 34.

A plurality of keys 42 are provided at a front surface of the main body section 40. In addition, a pair of rotation guide members 45 are provided at both upper side ends of the main body section 40. The first hinge shaft 24 provided at both ends of the body plate 22 is inserted into the rotation guide members 45. To this end, each of the rotation guide members 45 has a cylindrical cavity therein.

In addition, a display screen 52 is provided in the display section 50 for displaying various kinds of information. The display section 50 is connected to the connecting plate 32 of the second hinge section 30. Accordingly, the display section 50 is integrally operated with the connecting plate 32. That is, the display section 50 not only moves from the closed position to the open position, or vice versa, with respect to the main body section 40 about the first hinge shaft 24, but also rotates in directions left or right to the main body section 40 about the second hinge shaft 34.

As mentioned above, the body plate 22 and the connecting plate 32 of the swivel hinge, which connects the main body section 40 to the display section 50, are provided at both ends thereof with first and second magnets 26 and 36, respectively. Accordingly, when the display section 50 rotates in directions left or right to the main body section 40, the first and second magnets 26 and 36 allow the display section 50 to be stopped at a predetermined position with respect to the main body section 40.

FIG. 6 shows a portable terminal according to another embodiment

of the present invention. According to this embodiment, in order to allow the display section 50 to be stopped at a predetermined position with respect to the main body section 40, first magnets 26' are installed at upper side ends of the main body section 40 and second magnets 36' are installed at lower side ends of the display section 50 corresponding to the first magnets 26'.

Hereinafter, an operation of the swivel hinge and the portable terminal having the swivel hinge will be described.

Firstly, an operation of the swivel hinge installed in the portable terminal will be described with reference to FIGS. 4a to 4e.

FIG. 4a shows a state of the swivel hinge when the display section 50 is not rotated with respect to the main body section 40 as shown in FIG. 5. Thus, strong attractive force is created between the first and second magnets 26 and 36.

FIG. 4b shows a state of the swivel hinge when a user slightly rotates the display section 50 in the right or the left direction of the main body section 40. That is, the display section 50 rotates with respect to the main body section 40 about the second hinge shaft 34. Accordingly, attractive force between the first and second magnets 26 and 36 becomes weak. In this state, if the display section 50 further rotates, attractive force does not occur between first and second magnets 26 and 36.

FIG. 4c shows a state of the swivel hinge when the display section 50 rotates at a right angle with respect to the main body section 40. At this time, the body plate 33 is positioned perpendicular to the connecting

plate 32.

In this state, if the user further rotates the display section 50 in the same direction, as shown in FIG. 4d, the first hinge section 20 and the second hinge section 30 rotate about the second hinge shaft 34, so the main body section 40 and the display section 50 also rotate about the second hinge shaft 34. In addition, when the first magnet 26 is adjacent to the second magnet 36 due to the rotation of the display section 50, attractive force is created between the first and second magnets 26 and 36.

In this state, if the display section 50 further rotates, the first magnet 26 and the second magnet 36 are aligned in parallel due to attractive force between the first and second magnets 26 and 36 even if the user does not apply external force to the display section 50. That is, the relative position between the main body section 40 and the display section 50 is determined by means of the first and second magnets 26 and 36.

As described above, according to the present invention, the structure of the swivel hinge for facilitating the rotational movement of the display section can be simplified, so an assembling work thereof can be easily and simply carried out.

In addition, engagement structures between mechanical parts of the swivel hinge can be minimized and wear on mechanical parts can be reduced, so endurance and reliability of the swivel hinge and the portable terminal having the swivel hinge can be improved.

Furthermore, the display section can be rotated in the left or the

right direction of the main body section only when the display section is opened by a predetermined angle with respect to the main body section. Accordingly, the display section can rotate with respect to the main body section without being interfered by the main body section, so damage to the portable terminal caused by the interference between the display section and the main body section can be prevented.

Although a preferred embodiment of the present invention has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

【EFFECT OF THE INVENTION】

As described above, according to the present invention, the magnet is used for the display section in order to be stopped at a predetermined position with respect to the main body section when the display section rotates in directions left or right to a front of the main body section.

Therefore, the structure of the swivel hinge for facilitating the rotational movement of the folder section can be simplified, so an assembling work thereof can be easily and simply carried out.

In addition, since the magnet are substituted for the mechanical parts of the swivel hinge, the engagement structures between the mechanical parts can be minimized and wear on mechanical parts can be reduced, so endurance and reliability of the swivel hinge and the portable terminal having the swivel hinge can be improved.

【WHAT IS CLAIMED IS】

【CLAIM 1】

A swivel hinge comprising:

a first hinge section having a first hinge shaft as a rotational center thereof;

a second hinge section connected to the first hinge section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft; and

first and second magnets provided at first and second hinge sections, respectively, corresponding to each other and having polarities different from each other in such a manner that attractive force is created between the first and second magnets when the first and second hinge sections are positioned in parallel to each other.

【CLAIM 2】

The swivel hinge as claimed in claim 1, wherein the second hinge shaft is rotatably installed at one side of the first hinge section such that the second hinge shaft is rotated together with the first section when the first hinge section rotates about the first hinge shaft.

【CLAIM 3】

The swivel hinge as claimed in claim 1, wherein the first and second magnets are located on both lengthwise ends of the first and second hinge sections at positions, which are farthest from the second hinge shaft.

【CLAIM 4】

The swivel hinge as claimed in claim 1, wherein the first magnet is installed at both ends of a body plate of the first hinge section and the second magnet is installed at both ends of a connecting plate of the second hinge section.

【CLAIM 5】

The swivel hinge as claimed in claim 1, wherein the first magnet is formed at both ends of a body plate of the first hinge section and the second magnet is formed at both sides of a connecting plate of the second hinge section by magnetizing both ends of the body plate and the connecting plate.

【CLAIM 6】

A portable terminal comprising:

a main body section;

a display section connected to one end of the main body section and having a display screen;

a first hinge section having a first hinge shaft rotatably coupled to a rotational center portion formed in the main body section;

a second hinge section connected to the display section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft so as to be rotatably coupled to the first hinge section; and

first and second magnets provided at first and second hinge sections, respectively, corresponding to each other and having polarities different from each other in such a manner that attractive force is

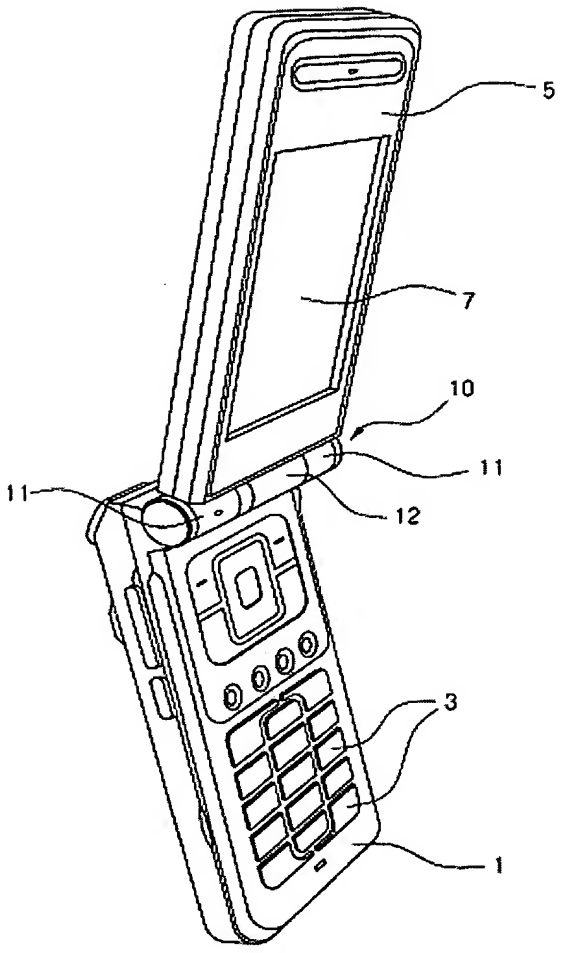
created between the first and second magnets when the first and second hinge sections are positioned in parallel to each other.

【CLAIM 7】

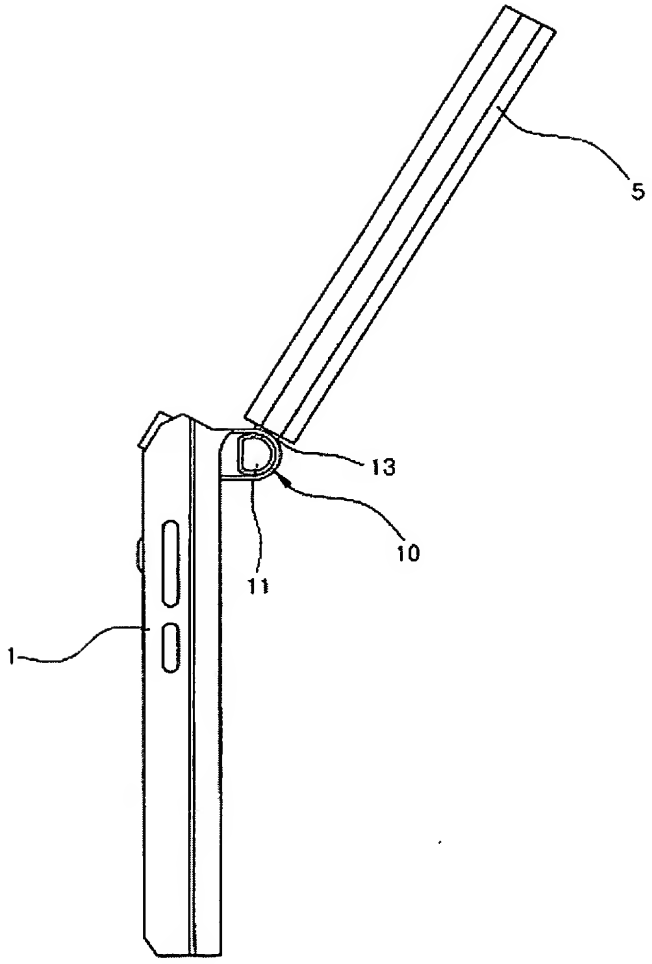
The portable terminal as claimed in claim 6, wherein the first magnet is installed at both upper side ends of the main body section and the second magnet is installed at both lower side ends of the display section corresponding to the first magnet in farthest positions from the second hinge shaft.

【FIG】

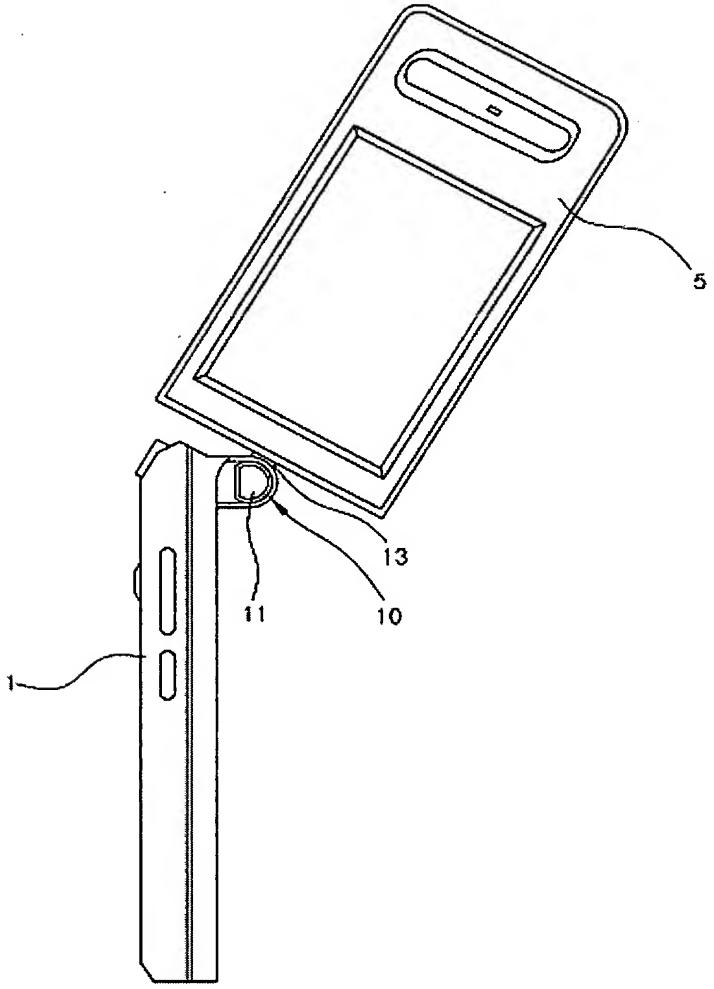
【FIG. 1】



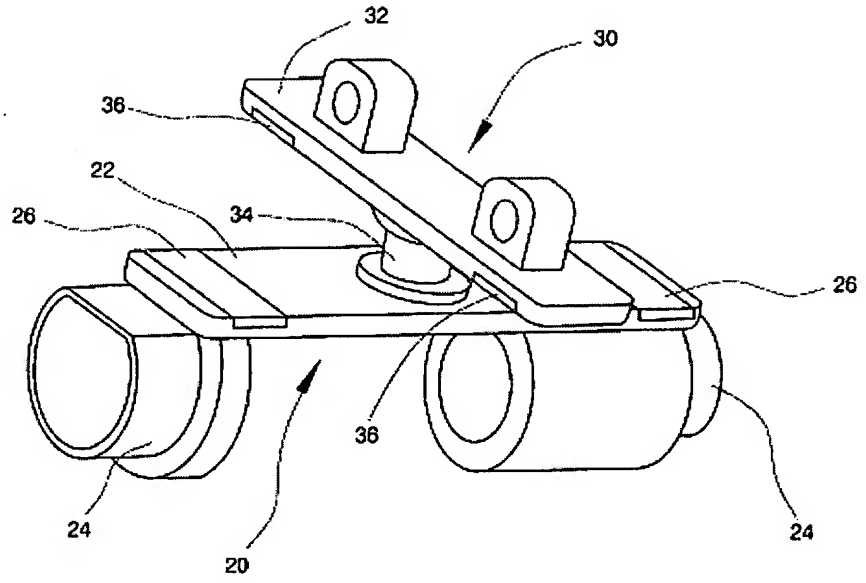
【FIG. 2a】



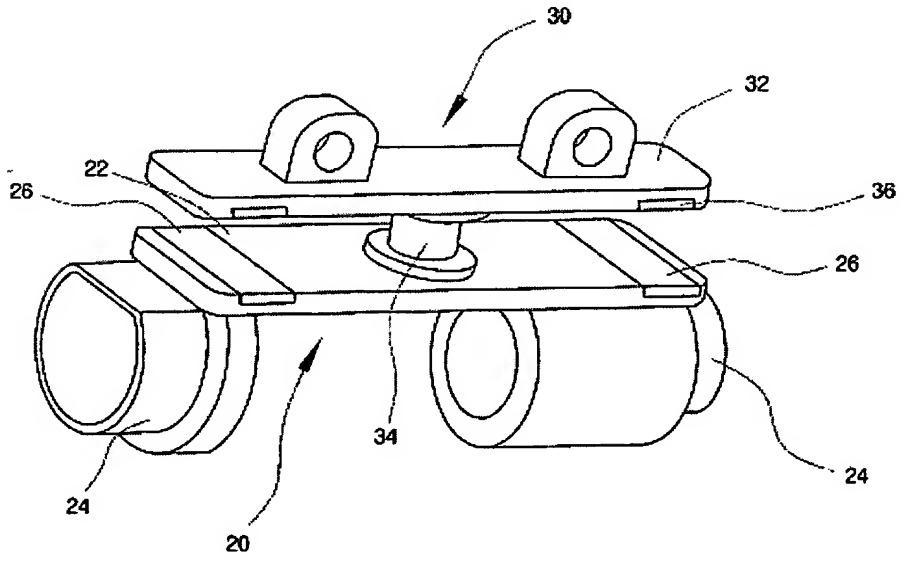
【FIG. 2b】



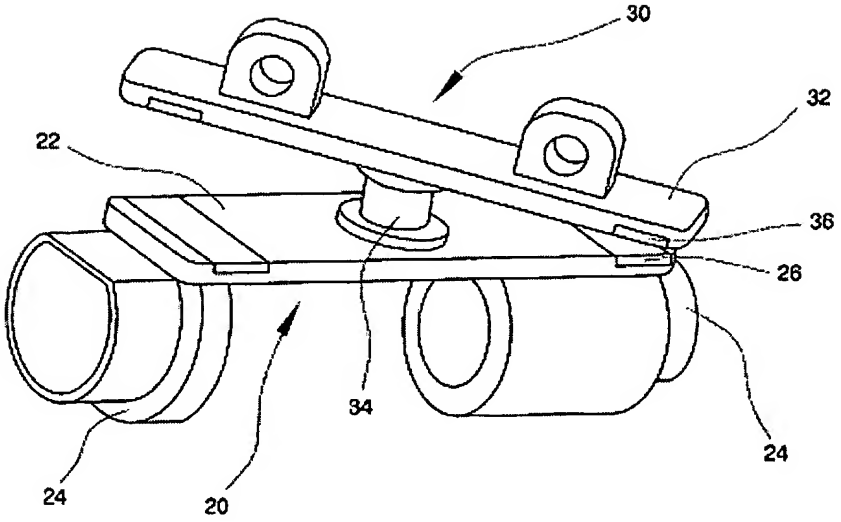
【FIG. 3】



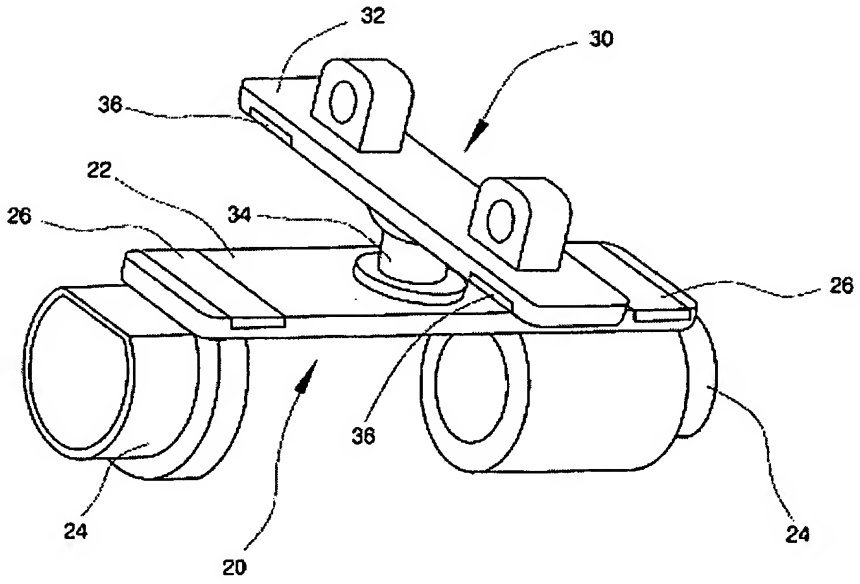
【FIG. 4a】



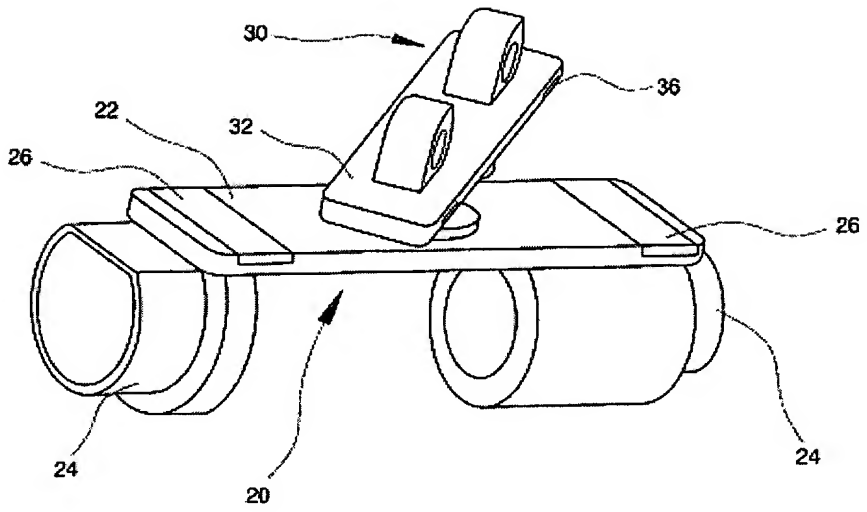
【FIG. 4b】



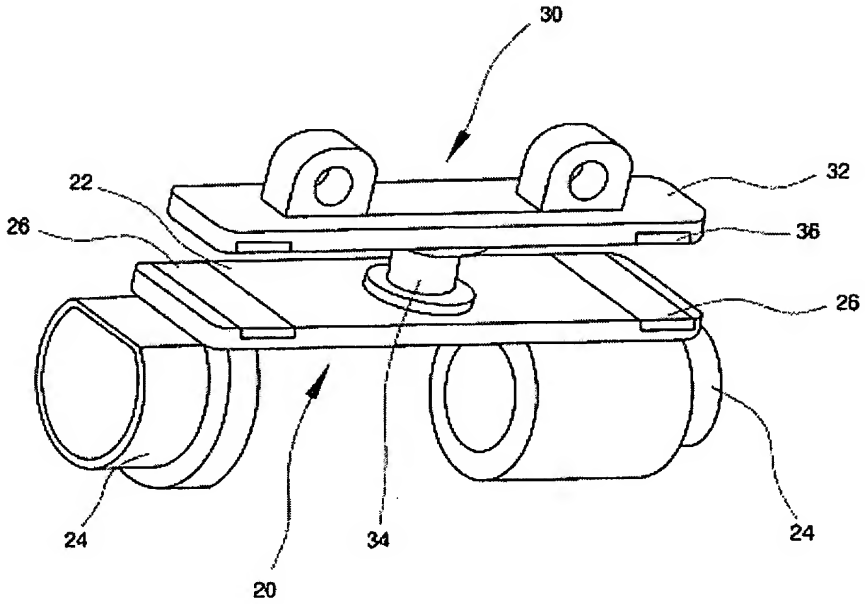
【FIG. 4c】



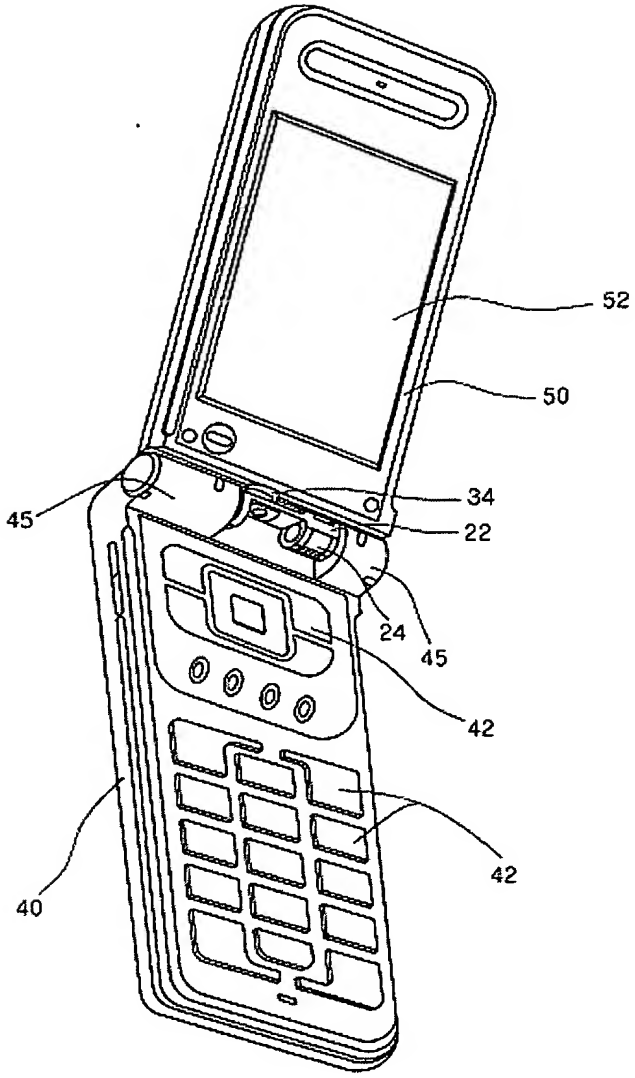
【FIG. 4d】



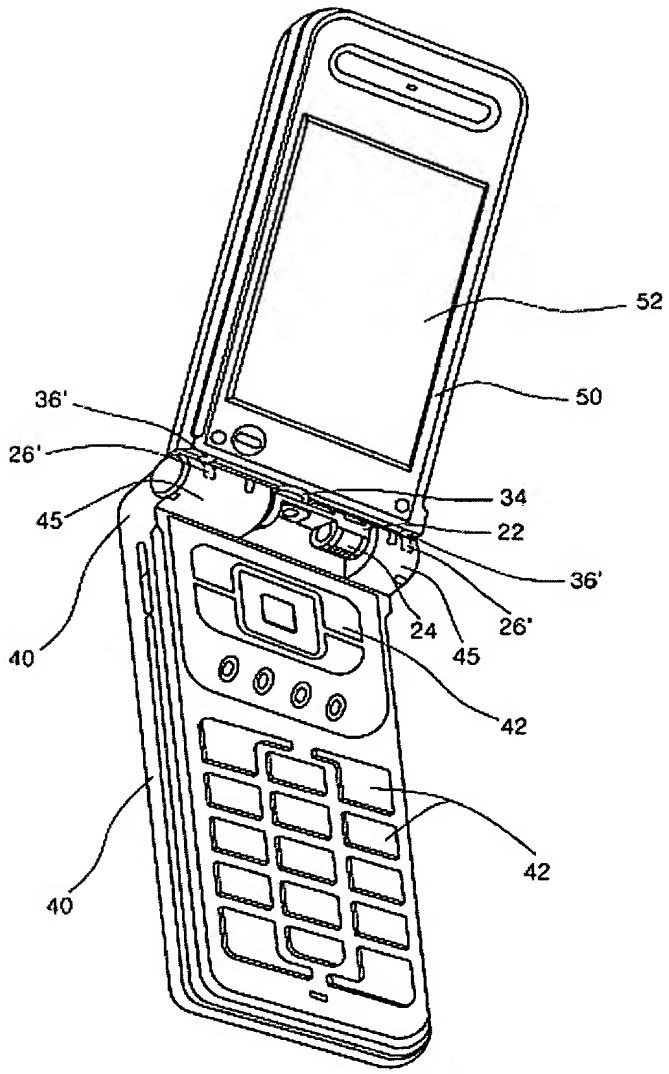
【FIG. 4e】



【FIG. 5】



【FIG. 6】



CERTIFICATION

It is hereby declared that the translation of Korean priority application No. 2003-0047445 filed on July 11, 2003 is true and correct.

Seoul, February 28, 2006
Translator: Kim Jukwang

【Name of Document】 Application Document

【Category】 Patent

【Receiving Office】 Commissioner

【Reference Number】 0003

【Submission Date】 2003. 07. 11

【Title of Invention】 스위블힌지 및 이를 사용한 폴더형 휴대 단말기

【Title of Invention in English】 Swivel hinge and folder type portable terminal using the same

【Applicant】

【Name】 LG Electronics Inc.

【Applicant's Code】 1-2002-012840-3

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【Nationality】 KR

【Purport】 submitted hereby is a application document pursuant Article 42 of Patent Law

Agent Woorin Patent Firm (sign)

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【Additional Fee】	4 pages	4,000 won
【Priority Claim Fee】	0 item	0 won
【Request for Examination Fee】	0 claim	0 won
【Amount of Fee】		33,000 won

【ABSTRACT OF THE DISCLOSURE】

【SUMMARY】

Disclosed are a swivel hinge and a portable terminal having the swivel hinge. The swivel hinge has a first hinge section having a first hinge shaft as a rotational center thereof and a second hinge section connected to the first hinge section and having a second hinge shaft as a rotational center thereof. The second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft. A stopper engagement section provided at one end of the second hinge shaft so as to rotate together with the second hinge shaft and formed at both side ends thereof with locking surfaces, which are symmetrically formed and the stopper having a surface facing the locking surfaces of the stopper engagement section for restricting rotation of the second hinge section, the stopper allowing the locking surfaces of the stopper engagement section to freely rotate when the first hinge section rotates by a predetermined angle. According to the portable terminal using the swivel hinge of the present invention, the folder section can rotate without being interfered by the main body section, so damage to the portable terminal caused by the interference between the folder section and the main body section can be prevented.

【REPRESENTATIVE VIEW】

Fig. 4a

【INDEX】

folder, portable terminal, swivel hinge, main body section, folder section

【DESCRIPTION】

【TITLE OF THE INVENTION】

SWIVEL HINGE AND PORTABLE TERMINAL USING THE SAME

【BRIEF DESCRIPTION OF THE DRAWINGS】

FIG. 1 is a perspective view showing a folder-type portable terminal according to a prior art;

FIG. 2 is a perspective view showing a swivel hinge using in a folder-type portable terminal according to a prior art;

FIG. 3 is a operational view showing a problem of a folder-type portable terminal according to a prior art;

FIGS. 4a is a perspective view showing a swivel hinge according to one embodiment of the present invention;

FIGS. 4b is a front view of the swivel hinge according to one embodiment of the present invention;

FIG. 5 is a bottom view of an engagement plate according to one embodiment of the present invention;

FIG. 6 is are operational views showing a relationship between a folder section and a stopper depending on an opening degree of the folder section;

FIG. 7 is a partially sectional perspective view showing a folder-type portable terminal according to one embodiment of the present invention; and

FIG. 8 is a perspective view showing a stopper according to another embodiment of the present invention.

* Description of symbols of major parts in the drawings *

20: opening hinge section 22: body plate

24: opening hinge shaft

25: click hinge

25': fixing member

26: stopper

27: front surface

27': guide surface

30: rotation hinge shaft

32: connecting plate

34: second hinge shaft

35: stopper engagement plate

36: locking surface

40: main body section

42: key

45: rotation guide member

50: folder section

52: display screen

【DETAILED DESCRIPTION OF THE INVENTION】

【PURPOSE OF THE INVENTION】

【TECHNICAL FIELD IN WHICH THE INVENTION IS INCLUDED AND THE PRIOR ART IN THAT FIELD】

The present invention relates to a portable terminal, and more particularly to a swivel hinge and portable terminal using the same allowing a folder section to optionally rotate according to an opening degree of the folder section.

A portable terminal is a device that can be carried and enables a user to utilize a variety of functions. They can be categorized by their functions: cellular phone whose primary function is a phone, PDA whose primary fuction is an electronic scheduler function, and smart phone that has both phone and electronic scheduler function. They can be categorized by their body types: bar type, slide type, flip type and folder type.

FIGS. 1 and 2 show a conventional portable terminal having a swivel hinge. Referring to FIGS. 1 and 2, various parts including a main

board are installed in a main body section 1. The main body section 1 is provided at a front surface thereof with a plurality of keys 3 for allowing a user to input various information.

A display section 5 is connected to one end of the main body section 1. The display section 5 is provided with a display screen 7 for displaying various kinds of information. The display section 5 is coupled to the main body section 1 through a swivel hinge 10 in such a manner that the display section 5 can be moved from an open position to a closed position, or vise versa, with respect to the main body section 1 while being rotated in a direction perpendicular to the moving direction.

The swivel hinge 10 includes a opening hinge section 11 positioned between a pair of rotation guide members 1', which are integrally formed at both upper side ends of the main body section 1. The opening hinge section 11 includes a opening hinge shaft 13 at both ends of a body plate 12. The opening hinge shaft 13 is inserted into the rotation guide members 1' rotatably.

The rotation hinge section 15 is provided at the opening hinge section 11. The rotation hinge section 15 includes a connecting plate 16 which is locked with the folder section 5 and a rotation hinge shaft 17 to rotate together with the connecting plate. The rotation hinge shaft 17 is installed at the body plate 12 of the opening hinge section rotatably.

Accordingly, if the rotation hinge section 15 rotates about the rotation hinge shaft 17 with respect to the opening hinge section 11, the folder section 1 is rotated in a left or a right direction of the main body section 1 when viewed from a front of the main body section 1.

However, the conventional portable terminal has problems as follows.

That is, the folder section 5 rotatably connected to the main body section 1 through the swivel hinge 10 may interfere with the main body section 1 if the folder section 5 rotates when the folder section 5 is insufficiently opened as shown in FIG. 3. If the folder section 5 interferes with the main body section 1, the folder section 5 cannot easily rotate and the main body section 1 and the folder section 5 may be damaged.

【TECHNICAL TASK WHICH THE PRESENT INVENTION TRIES TO BE OBTAINED】

Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the conventional art, and an object of the present invention is to provide a folder-type portable terminal having a swivel hinge capable of preventing a folder section from interfering with a main body section.

【CONSTITUTION OF THE INVENTION】

To accomplish the above objects, according to a first aspect of the present invention, there is provided a swivel hinge comprising: a first hinge section having a first hinge shaft as a rotational center thereof; a second hinge section connected to the first hinge section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft; a stopper engagement section provided at one end of the second hinge shaft so as to rotate together with the second hinge shaft and formed at both side ends thereof with locking surfaces, which are symmetrically formed; and a stopper having a surface facing the locking surfaces of the stopper engagement section for restricting rotation of the second hinge section, the stopper allowing the locking

surfaces of the stopper engagement section to freely rotate when the first hinge section rotates by a predetermined angle.

The stopper engagement section has a plate shape and the locking surfaces of the engagement section are formed through cutting both sides of stopper engagement section.

The stopper has a guide surface for allowing the stopper engagement section to rotate, and the guide surface of the stopper has a height allowing lower portions of the locking surfaces of the stopper engagement section to pass beyond the guide surface when the first hinge section rotates by a predetermined angle.

The guide surface is divided into a horizontal surface and an inclined surface about a center thereof, and an inclination angle of the inclined surface is in a range of more than 0° and identical to or less than 60°.

The first hinge section has a body plate provided at both ends thereof with the first hinge shaft having a cylindrical shape and the second hinge section has a connecting plate provided with the second hinge shaft rotatably coupled to the body plate.

According to a second aspect of the present invention, there is provided a portable terminal comprising: a main body section; a main body section; a folder section connected to one end of the main body section and movable from an open position, in which the folder section is shifted away from the main body section, to a closed position, in which the folder section is overlapped with the main body section, or vice versa; a first hinge section having a first hinge shaft rotatably coupled to a rotational center portion formed in the main body section; a second hinge section connected to the folder section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a

direction perpendicular to an extension direction of the first hinge shaft so as to be rotatably coupled to the first hinge section; a stopper engagement section provided at one end of the second hinge shaft so as to rotate together with the second hinge shaft and formed at both side ends thereof with locking surfaces, which are symmetrically formed; and a stopper having a surface facing the locking surfaces of the stopper engagement section for restricting rotation of the second hinge section, the stopper being fixed to the main body section so as to allow the locking surfaces of the stopper engagement section to freely rotate when the first hinge section rotates by a predetermined angle.

The stopper engagement section has a plate shape and the locking surfaces of the engagement section are formed through cutting both sides of stopper engagement section.

The stopper is formed at an upper portion thereof with a guide surface, which is parallel to an upper surface of the main body section, the guide surface being positioned below the stopper engagement section when the guide surface is parallel to a lower surface of the stopper engagement section.

The guide surface of the stopper is divided into a horizontal surface and an inclined surface about a center thereof, and an inclination angle of the inclined surface is in a range of more than 0° and identical to or less than 60°.

The stopper is provided at one end of the click hinge installed by passing through a center of the first hinge shaft of the first hinge section, and a fixing section is provided at one end of the click hinge for fixing the stopper to the main body section.

According to the present invention, the swivel hinge and the portable terminal using the same has the advantage of having capability

of preventing a folder section from interfering with a main body section.

Hereinafter, a swivel hinge and a portable terminal having the swivel hinge according to a preferred embodiment of the present invention will be described with reference to the accompanying drawings.

FIGS. 4 shows a perspective view of a swivel hinge according to one embodiment of the present invention

As shown in FIG. 4, the swivel hinge of the present invention mainly includes a opening hinge section 20 and a rotation hinge section 30. Members of the portable terminal performing a relative rotating action by means of the swivel hinge, such as a main body section and a display section, are connected to the opening and rotation hinge sections 20 and 30. The opening hinge section 20 is rotatably installed at a rotational center of the main body section.

The opening hinge section 20 has a body plate 22 provided at both sides thereof with a opening hinge shaft 24. The body plate 22 rotates together with the opening hinge shaft 24, so it is preferable to integrally fabricate the body plate 22 with the opening hinge shaft 24. However, it is also possible to fabricate the hinge shaft 24 and the body plate 22 separately. In addition, although the opening hinge shaft 24 is illustrated as a cylindrical shape, the present invention does not limit the shape of the opening hinge shaft 24 if the first hinge shaft can rotate about a rotational center.

In addition, a click hinge 25 is provided while passing through a center of the first hinge shaft 24. The click hinge 25 adjusts an opening degree of a part fixed to a connecting plate 32 and has a cam and a

spring therein.

A stopper 26 is provided while passing through the click hinge 25. The stopper 26 is positioned at one end of a central shaft 25b of the click hinge 25 and connected to a fixing member 25' provided at the other end of the click hinge 25 through the central shaft 25b. Since the stopper 26 is fixed by means of the fixing member 25, the stopper 26 does not rotate. The stopper 26 has an elongated plate shape. However, the present invention does not limit the shape of the stopper 26. The stopper 26 includes a front surface 27 corresponding to a locking surface 36 of a stopper engagement plate 35, which will be described below, and a guide surface 27' formed at a right angle with respect to the front surface 27. The guide surface 27' extends in a predetermined direction in order to limit a rotational range of the stopper engagement plate 35.

The rotation hinge section 30 has the connecting plate 32. The connecting plate 32 is coupled to one of members of the portable terminal, which can be relatively rotated by means of the swivel hinge. For example, the connecting plate 32 is connected to the folder section of the portable terminal.

The connecting plate 32 of the rotation hinge section 30 has a rotation hinge shaft 34. The rotation hinge shaft 34 is rotatably connected to the body plate 22 of the first hinge section 20. An imaginary rotational center line of the rotation hinge shaft 34 is perpendicular to an imaginary rotational center line of the first hinge shaft 24.

The stopper engagement plate 35 is provided at one end of the rotation hinge shaft 34 adjacent to the first hinge shaft 24. The stopper engagement plate 35 has a substantially circular plate shape formed at a center thereof with a perforation hole. As shown in FIG. 5, the stopper

engagement plate 35 is formed at both side ends thereof with locking surfaces 36. The locking surfaces 36 are formed by cutting both sides of the stopper engagement plate 35. Preferably, the locking surfaces 36 are symmetrically formed at both sides of the stopper engagement plate 35. In a normal state, the locking surfaces 36 face the front surface 27 of the stopper 26 in order to prevent the stopper engagement plate 35 from being rotated.

Hereinafter, a portable terminal equipped with the swivel hinge having the above structure will be described with reference to FIG. 7. The portable terminal includes a main body section 40 and a folder section 50, which are connected to each other by means of the swivel hinge. The folder section 50 rotates about the first hinge shaft 24 with respect to the main body section 50. That is, the folder section 50 is movable from a closed position, in which the folder section 50 is overlapped with the main body section 40, to an open position, in which the folder section 50 is shifted away from the main body section 40, or vice versa. In addition, when viewed from a front of the main body section 40, the folder section 50 rotates in a left or a right direction of the main body section 40 about the rotation hinge shaft 34.

A plurality of keys 42 are provided at a front surface of the main body section 40. In addition, a pair of rotation guide members 45 are provided at both upper side ends of the main body section 40. The first hinge shaft 24 provided at both ends of the body plate 22 is inserted into the rotation guide members 45. To this end, the rotation guide members 45 have a cylindrical cavity therein.

In addition, a display screen 52 is provided in the folder section 50 for displaying various kinds of information. The folder section 50 is connected to the connecting plate 32 of the rotation hinge section 30.

Accordingly, the folder section 50 is integrally operated with the connecting plate 32. That is, the folder section 50 not only moves from the closed position to the open position, or vice versa, with respect to the main body section 40 about the first hinge shaft 24, but also rotates in the left or the right direction of the main body section 40 about the rotation hinge shaft 34.

Meanwhile, the stopper 26 is provided at an end of the click hinge 25 formed by passing through the first hinge shaft 24 of the first hinge section 120. The guide surface 27' of the stopper 26 is parallel to an upper surface of the main body section 40. That is, the stopper 26 extends in parallel to the upper surface of the main body section 40. The stopper 26 is fixed to the main body section 40 by means of the fixing member 25'.

The stopper engagement plate 35 is provided at one end of the rotation hinge shaft 34. One of the locking surfaces 36 of the stopper engagement plate 35 is positioned corresponding to the front surface 27 of the stopper 26 until the folder section 50 is opened by a predetermined angular degree. When the folder section 30 is opened exceeding the predetermined angular degree, the locking surface 36 is shifted to a predetermined position corresponding to an upper portion of the guide surface 27'.

Hereinafter, operations of the swivel hinge and a folder-type portable terminal having the swivel hinge according to the present invention will be described.

Firstly, the operation of the swivel hinge equipped in the folder-type portable terminal will be described below with reference to FIGS. 6a to 6c.

FIG. 6a shows a state of the folder-type portable terminal when

the folder section 50 is in the closed position with respect to the main body section 40. At this time, the locking surfaces 36 of the stopper engagement plate 35 face the front surface 27 of the stopper 26. When viewed from a side of the folder-type portable terminal, the locking surfaces 36 of the stopper engagement plate 35 are perpendicularly formed with respect to the stopper 26.

Accordingly, the locking surfaces 36 of the stopper engagement plate 35 make contact with the front surface 27 of the stopper 26, so that the stopper plate 35 does not rotate. In other word, the rotation hinge section 30 does not rotate with respect to the first hinge section 20. That is, the folder section 50 does not rotate with respect to the main body section 40.

FIG. 6b shows a state of the folder-type portable terminal when the folder section 50 rotates at a right angle with respect to the main body section 40. At this time, the locking surfaces 36 of the stopper engagement plate 35 do not face the front surface 27 of the stopper 26. Particularly, a lower surface of the stopper engagement plate 35 does not face the guide surface 27' of the stopper due to rotation of the stopper engagement plate 35. That is, the stopper engagement plate 35 can rotate regardless of the stopper 26. In the state shown in FIG. 6b, the folder section 50 does not rotate with respect to the main body section 40.

FIG. 6c shows a state of the folder-type portable terminal when the folder section 50 rotates above the right angle with respect to the main body section 40. Generally, the folder section 50 is designed such that it is opened with respect to the main body section 40 at a predetermined angle. The predetermined angle can vary depending on sorts of portable terminals and design conditions thereof. In general, the

predetermined angle is in a range about 135 to 150 degrees.

In the state shown in FIG. 6c, the locking surfaces 36 of the stopper engagement plate 35 make contact with the front surface 27 of the stopper 26, so the folder section 50 does not rotate with respect to the main body section 40.

In addition, as shown in FIG. 8, in order to allow the folder section 50 to rotate about the rotation hinge shaft 34 when the folder section 50 has been rotated beyond a right angle with respect to the main body section 40, it is required to form the guide surface 27' of the stopper 26 in such a manner that an angle (θ) between both ends of the guide surface 27' about a center line thereof exceeds 180°. For example, in order to open the folder section 50 by 150° with respect to the main body section 40, the angle (θ) between both ends of the guide surface 27' must be formed at 240°. And, in order to open the folder section 50 by 135° with respect to the main body section 40, the angle (θ) between both ends of the guide surface 27' must be formed at 225°. At this time, a lower portion of the guide surface 27' forwarding the lower portion of the main body section 40 forms a horizontal surface, and the remaining part of the guide surface 27' forms an inclined surface.

Accordingly, due to the stopper 26 as shown in FIG. 8, the folder section 50 can rotate about the second hinge 34 even if the folder section 50 is opened at 90°, or more than 90°, with respect to the main body section 40.

Although a preferred embodiment of the present invention has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

【EFFECT OF THE INVENTION】

As described above, according to the present invention, the folder section can be rotated in the left or the right direction of the main body section only when the folder section is opened by a predetermined angle with respect to the main body section.

Accordingly, the folder section can rotate with respect to the main body section without being interfered by the main body section, so damage to the portable terminal caused by the interference between the folder section and the main body section can be prevented.

【WHAT IS CLAIMED IS】

【CLAIM 1】

A swivel hinge comprising:

a first hinge section having a first hinge shaft as a rotational center thereof;

a second hinge section connected to the first hinge section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft;

a stopper engagement section provided at one end of the second hinge shaft so as to rotate together with the second hinge shaft and formed at both side ends thereof with locking surfaces, which are symmetrically formed; and

a stopper having a surface facing the locking surfaces of the stopper engagement section for restricting rotation of the second hinge section, the stopper allowing the locking surfaces of the stopper engagement section to freely rotate when the first hinge section rotates by a predetermined angle.

【CLAIM 2】

The swivel as claimed in claim 1, wherein the stopper engagement section has a plate shape and the locking surfaces of the engagement section are formed through cutting both sides of stopper engagement section.

【CLAIM 3】

The swivel as claimed in claim 1 or 2, wherein the stopper has a guide surface for allowing the stopper engagement section to rotate, and the guide surface of the stopper has a height allowing lower portions of

the locking surfaces of the stopper engagement section to pass beyond the guide surface when the first hinge section rotates by a predetermined angle.

【CLAIM 4】

The swivel as claimed in claim 3, wherein the guide surface is divided into a horizontal surface and an inclined surface about a center thereof, and an inclination angle of the inclined surface is in a range of more than 0° and identical to or less than 60°.

【CLAIM 5】

The swivel as claimed in claim 4, wherein the first hinge section has a body plate provided at both ends thereof with the first hinge shaft having a cylindrical shape and the second hinge section has a connecting plate provided with the second hinge shaft rotatably coupled to the body plate.

【CLAIM 6】

A folder-type portable terminal comprising:

a main body section;

a folder section connected to one end of the main body section and movable from an open position, in which the folder section is shifted away from the main body section, to a closed position, in which the folder section is overlapped with the main body section, or vice versa;

a first hinge section having a first hinge shaft rotatably coupled to a rotational center portion formed in the main body section;

a second hinge section connected to the folder section and having a second hinge shaft as a rotational center thereof, the second hinge shaft extending in a direction perpendicular to an extension direction of the first hinge shaft so as to be rotatably coupled to the first hinge

section;

a stopper engagement section provided at one end of the second hinge shaft so as to rotate together with the second hinge shaft and formed at both side ends thereof with locking surfaces, which are symmetrically formed; and

a stopper having a surface facing the locking surfaces of the stopper engagement section for restricting rotation of the second hinge section, the stopper being fixed to the main body section so as to allow the locking surfaces of the stopper engagement section to freely rotate when the first hinge section rotates by a predetermined angle.

【CLAIM 7】

The folder-type portable terminal as claimed in claim 6, wherein the stopper engagement section has a plate shape and the locking surfaces of the engagement section are formed through cutting both sides of stopper engagement section.

【CLAIM 8】

The folder-type portable terminal as claimed in claim 6 or 7, wherein the stopper is formed at an upper portion thereof with a guide surface, which is parallel to an upper surface of the main body section, the guide surface being positioned below the stopper engagement section when the guide surface is parallel to a lower surface of the stopper engagement section.

【CLAIM 9】

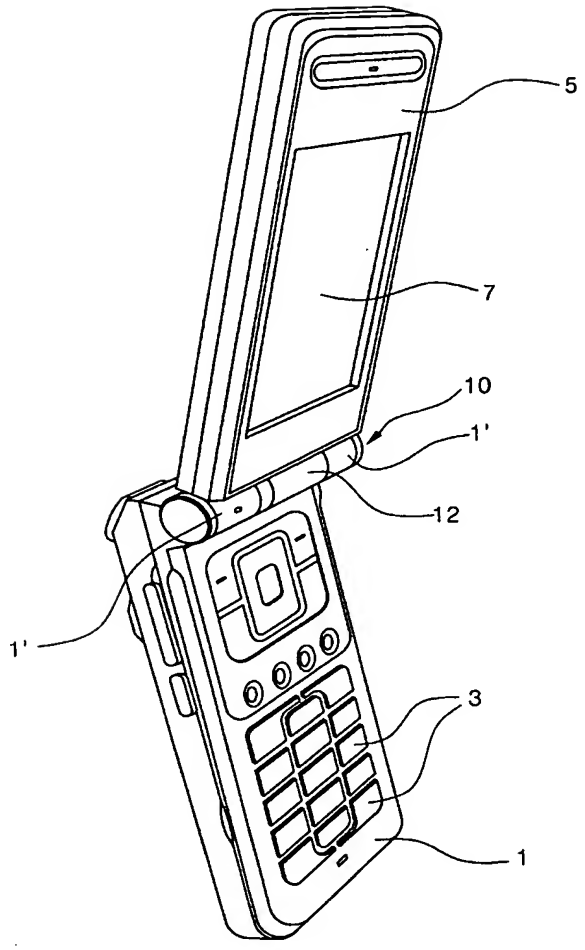
The folder-type portable terminal as claimed in claim 8, wherein the guide surface of the stopper is divided into a horizontal surface and an inclined surface about a center thereof, and an inclination angle of the inclined surface is in a range of more than 0° and identical to or less than 60°.

【CLAIM 10】

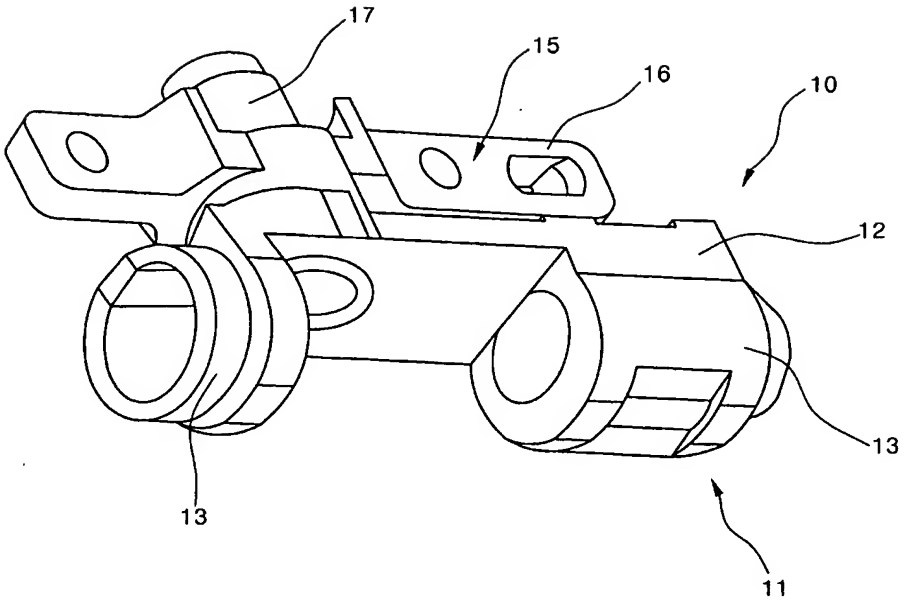
The folder-type portable terminal as claimed in claim 6 or 7, wherein the stopper is provided at one end of the click hinge installed by passing through a center of the first hinge shaft of the first hinge section, and a fixing section is provided at one end of the click hinge for fixing the stopper to the main body section.

【FIG】

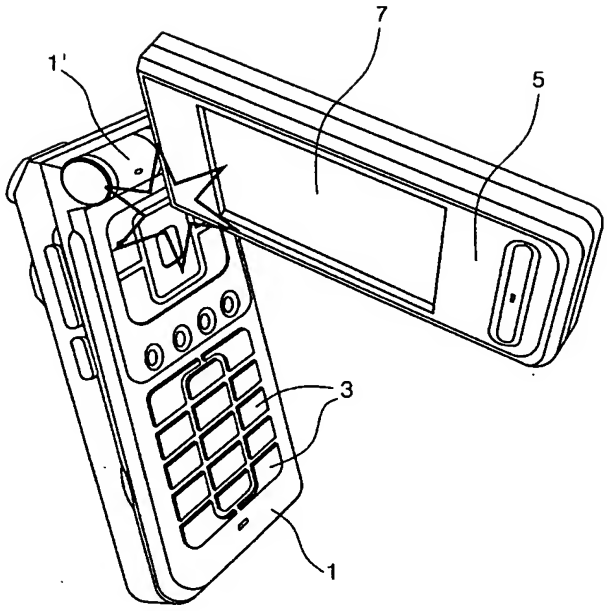
【FIG. 1】



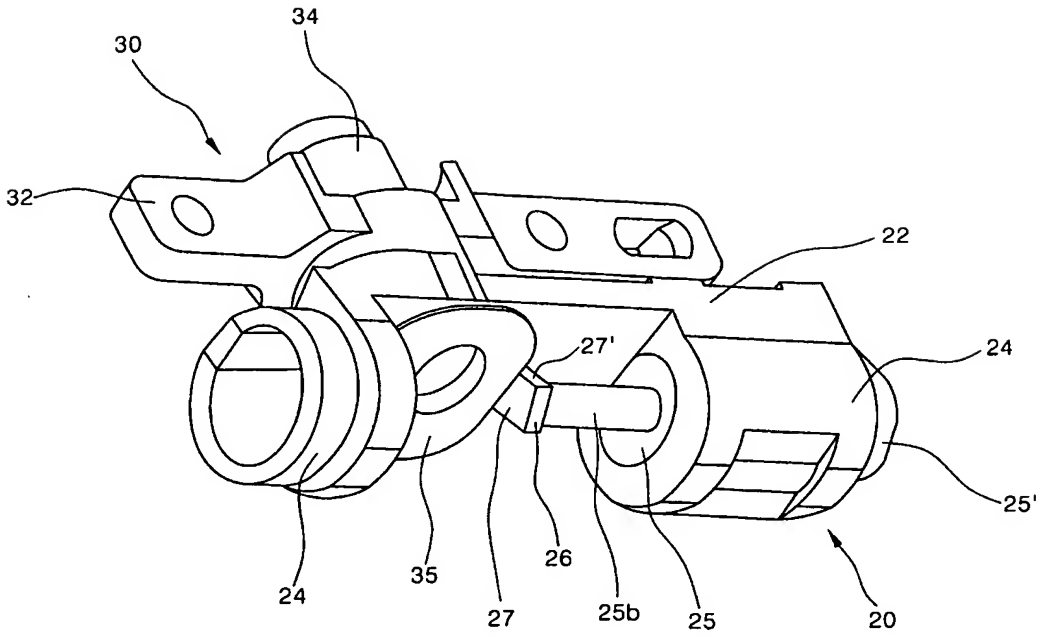
【FIG. 2】



【FIG. 3】



【FIG. 4a】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34
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22
27'
24
25'
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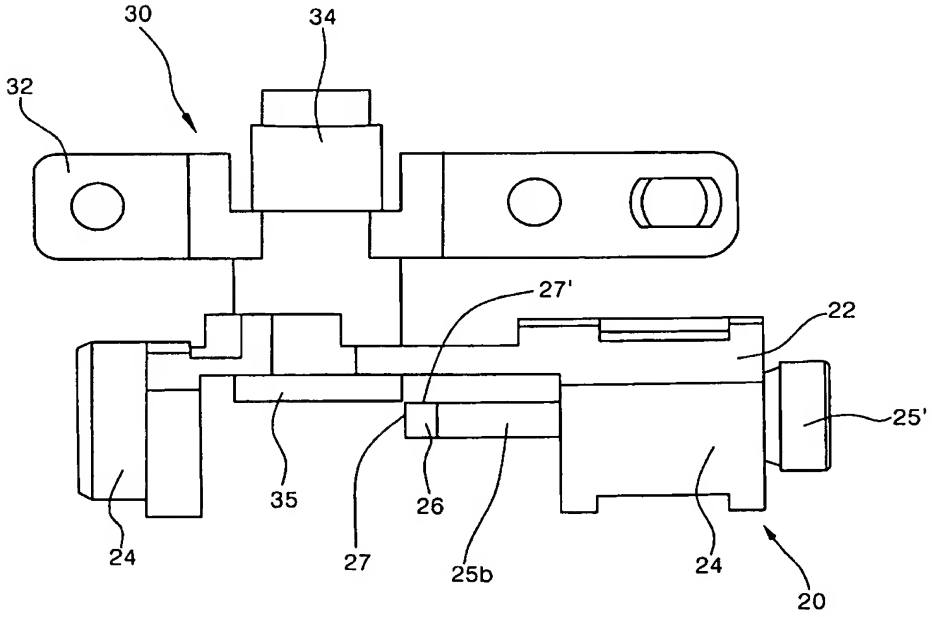
25b
25
20

【FIG. 4b】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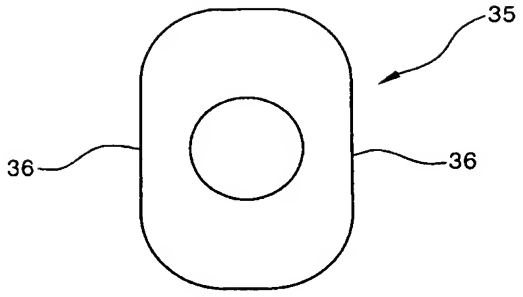
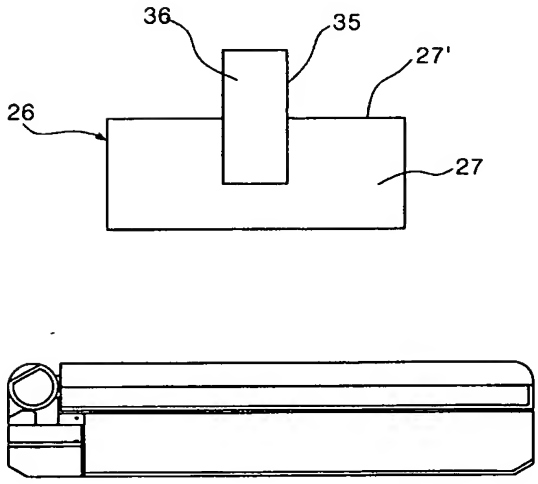
27'
22
25'
35
26
24
27
25b
24
20

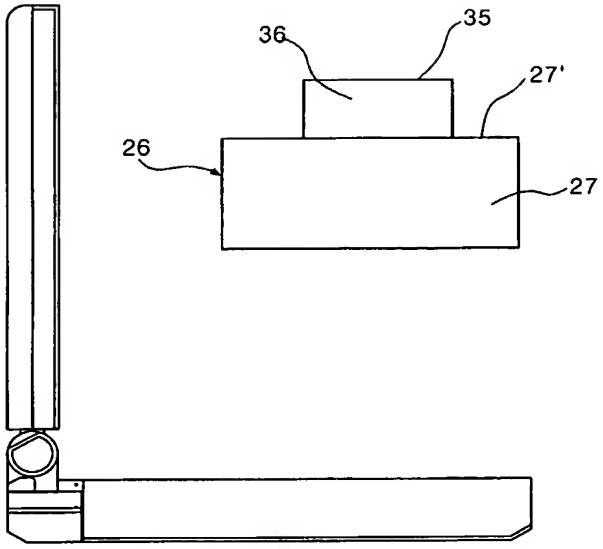
【FIG. 5】



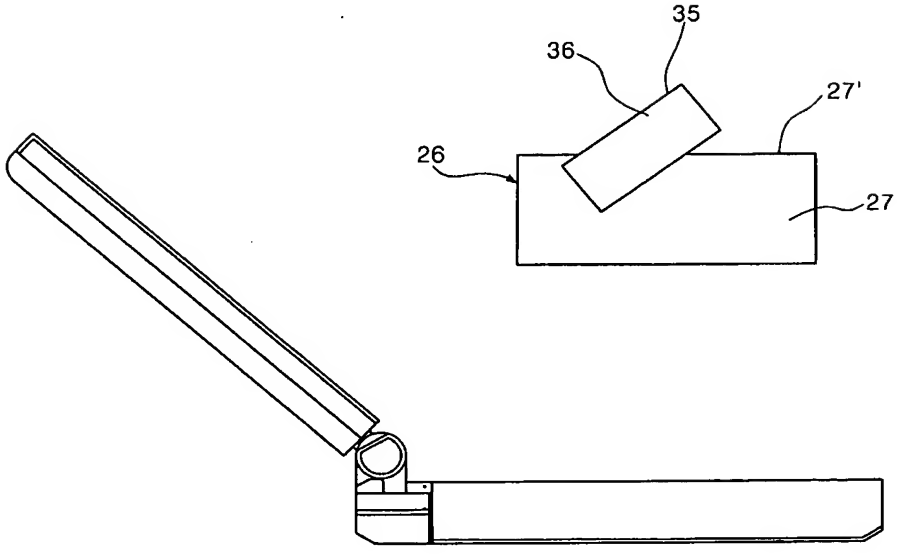
【FIG. 6a】



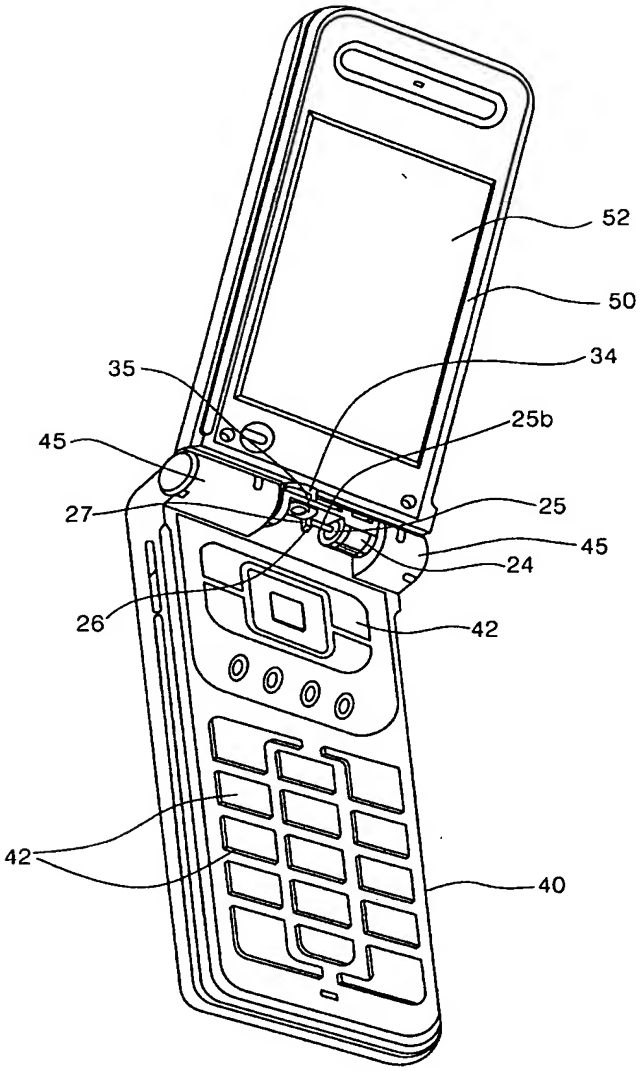
【FIG. 6b】



【FIG. 6c】



【FIG. 7】



【FIG. 8】